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| 09/839,786      | 04/19/2001  | Jonathan C. Mallari  | 690089.401C3        | 2552             |

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EXAMINER

CREPEAU, JONATHAN

| ART UNIT | PAPER NUMBER |
|----------|--------------|
|----------|--------------|

1746

DATE MAILED: 02/14/2003

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Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

09/839,786

Applicant(s)

MALLARI ET AL.

Examiner

Jonathan S. Crepeau

Art Unit

1746

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 19 April 2001.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-19 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-16, 18 and 19 is/are rejected.
- 7) ☒ Claim(s) 17 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 8/26/02 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

**Priority under 35 U.S.C. §§ 119 and 120**

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All   b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☒ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) \_\_\_\_\_
- 4) ☐ Interview Summary (PTO-413) Paper No(s). \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_

## **DETAILED ACTION**

### ***Drawings***

1. The drawings are objected to because there appear to be two different sets of drawings in the file. The application was originally filed with 37 drawing sheets containing Figures 1-65C. However, new drawing sheets containing Figures 1-4C were filed on August 26, 2002. These new sheets do not appear to correspond to the specification. Thus, the original drawings appear to be the correct ones. Resolution or clarification of the discrepancy is required.

### ***Claim Objections***

2. Claims 10 and 15 are objected to because of the following informalities: in claim 10, line 4, "plurality pores" should be "plurality of pores"; in claims 10 and 15, lines 5 and 8 respectively, "inner pores surfaces" should be "inner pore surfaces." Appropriate correction is required.

### ***Claim Rejections - 35 USC § 102***

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

4. Claims 1, 3, and 4 are rejected under 35 U.S.C. 102(b) as being anticipated by DE 19820756. Regarding claim 1, the DE '756 publication is directed to perforated silicon

workpieces that may be used as electrodes in fuel cells (see abstract). Regarding claim 4, the workpiece has a porous region containing acicular pores (4) disposed across the top surface thereof (see Fig. 4). Regarding claim 1, the silicon may be selectively n-doped (based on an oral translation of col. 2, line 61). Thus, the workpiece would inherently function as a current collector for the transmission of electrical current. Regarding claim 3, the substrate is derived from a silicon wafer (col. 1, line 64).

Thus, the instant claims are anticipated.

#### *Claim Rejections - 35 USC § 103*

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. Claims 1, 3-10, 12-15, 18, and 19 are rejected under 35 U.S.C. 103(a) as being unpatentable over FR 2667728 in view of DE 19820756.

Regarding claims 1, 10, and 15, the French reference is generally directed to an electrode assembly for a fuel cell (see abstract, Figure 1). The assembly comprises an anode, cathode and electrolyte (3, 9). Regarding claims 4, 10, and 15, each electrode comprises a plurality of pores (7) (see Fig. 2). Regarding claims 5, 7, 10, and 15, the pores have catalyst particles (8) uniformly dispersed thereon (see Fig. 2). Regarding claims 9, 14, and 19, the catalyst particles

are made of platinum (see page 5, line 4 of translation).

The French reference does not expressly teach that the electrodes comprise silicon substrates which are selectively doped, as recited in claims 1, 10, and 15, or that the electrodes comprise a plurality of acicular pores (claim 6).

As stated in section 4 above, the DE '756 publication is directed to porous n-doped silicon substrates that may be used as current-collecting electrodes in fuel cells. Additionally, the top of the substrate comprises a "porous bulk matrix region," as recited in claims 10 and 15.

Therefore, the invention as a whole would have been obvious to one of ordinary skill in the art at the time the invention was made because the artisan would be motivated to use the silicon substrate of the German reference as the anode and cathode catalyst supporting structures of the French reference. In the abstract, the German reference teaches that "the incompletely perforated second regions provide the perforated workpiece with increased strength and stability in an inexpensive manner, so that the risk of breakage during mounting is reduced."

Accordingly, the artisan would be motivated by this disclosure to use the workpiece of the German reference as the catalyst supporting structure in the electrodes of the French reference.

Regarding claims 8, 13, and 18, which recite that the catalyst particles are "chemisorbed," this limitation does not have to be accorded patentable weight because it does not appear to further limit the structure of the final product. See MPEP §2113.

Regarding the limitation in claim 15 that "the one or more selectively doped regions corresponds to the one or more discrete porous bulk matrix regions," this limitation would be rendered obvious by the disclosure of the DE '756 reference. The artisan may infer that the entire substrate of the reference is n-doped since there does not appear to be a disclosure of

plural doped regions. It may also be ascertained that the entire top surface of the substrate comprises the porous matrix region. Thus, the porous matrix region would “correspond” to the selectively doped region, as recited in claim 15.

7. Claims 2, 11, and 16 are rejected under 35 U.S.C. 103(a) as being unpatentable over FR 2667728 in view of DE 19820756 as applied to claims 1, 3-10, 12-15, 18, and 19 above, and further in view of Salinas et al (U.S. Patent 5,958,616).

The French reference does not expressly teach that the fuel cell is a direct methanol fuel cell.

The patent of Salinas et al. is directed to direct methanol fuel cell employing a liquid methanol reactant (see col. 1, line 30 et seq.).

Therefore, the invention as a whole would have been obvious to one of ordinary skill in the art at the time the invention was made because the disclosure of Salinas et al. would motivate the artisan to feed a liquid methanol solution to the anode of the French reference. In column 1, line 35, Salinas et al. teach that “methanol is particularly attractive in this respect since it possesses a high energy density and, because it is a liquid at ambient temperatures like gasoline, much of the infrastructure is already in place for its safe storage and handling.” Accordingly, the artisan would be motivated to feed a liquid methanol solution to the anode of the fuel cell of the French reference, thereby rendering the cell a direct methanol fuel cell.

### ***Double Patenting***

8. The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. See *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and, *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent is shown to be commonly owned with this application. See 37 CFR 1.130(b).

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

9. Claims 1-16, 18 and 19 are provisionally rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1-8, 14-16, 18, 19, 21-24, 29-62 and 65 of copending Application No. 09/715,830 in view of DE 19820756 and Shackelford (*Mat. Sci. for Engineers*, 1992).

The claims of the '830 application do not recite that the silicon substrates comprise one or more selectively doped regions (instant claims 1, 10, and 15) or that the substrates comprise an array of acicular pores (instant claim 6).

As stated in section 4 above, the DE '756 publication is directed to porous n-doped silicon substrates that may be used as electrodes in fuel cells. The pores are acicular pores which extend through the substrate.

Additionally, in Figure 12.2-1, Shackelford teaches that adding an n-type dopant to silicon provides extra electrons not needed for bonding to Si atoms, and further teaches on page

581 that the energy barrier to forming a conduction electron is less in an n-type material than in an intrinsic material, thereby increasing electrical conductivity.

Therefore, the instant claims would be rendered obvious over the claims of the '730 application because the artisan would be motivated by the disclosures of the German reference and Shackelford to n-dope the silicon substrate of the '730 claims to increase its electrical conductivity. Accordingly, the instant claims are considered to define an obvious variation of the invention recited in the '730 claims.

This is a provisional obviousness-type double patenting rejection.

10. Claims 1-4 and 6 are provisionally rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1-21 of copending Application No. 09/839,787 in view of DE 19820756 and Shackelford.

The claims of the '787 application do not recite that the silicon substrate comprises one or more selectively doped regions, as recited in claim 1.

As stated above, the DE '756 publication is directed to porous n-doped silicon substrates that may be used as electrodes in fuel cells.

As also stated above, Shackelford teaches that adding an n-type dopant to silicon provides extra electrons not needed for bonding to Si atoms, and that the energy barrier to forming a conduction electron is less in an n-type material than in an intrinsic material, thereby increasing electrical conductivity.



Therefore, the instant claims would be rendered obvious over the claims of the '787 application because the artisan would be motivated by the disclosures of the German reference and Shackelford to n-dope the silicon substrate of the '787 claims to increase its electrical conductivity. Accordingly, the instant claims are considered to define an obvious variation of the invention recited in the '787 claims.

This is a provisional obviousness-type double patenting rejection.

***Allowable Subject Matter***

11. Claim 17 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

12. The following is an examiner's statement of reasons for allowance:

Claim 17 recites that the plurality of pores are interconnecting mesoporous or macroporous acicular pores. The art of record, particularly DE 19820756, does not fairly teach or suggest this limitation. DE '756, while teaching acicular pores, does not fairly suggest that these pores are "interconnected" (herein, "interconnected" is interpreted as being connected *within* the substrate, not on the surface thereof). Accordingly, claim 17 contains allowable subject matter.

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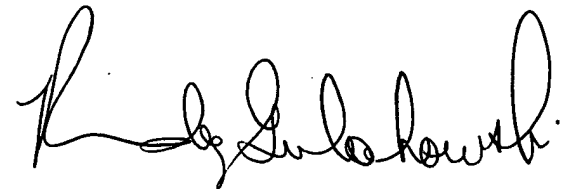
*Conclusion*

13. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jonathan Crepeau whose telephone number is (703) 305-0051.

The examiner can normally be reached Monday-Friday from 9:30 AM - 6:00 PM EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Randy Gulakowski, can be reached at (703) 308-4333. The phone number for the organization where this application or proceeding is assigned is (703) 305-5900. Additionally, documents may be faxed to (703) 305-5408 or (703) 305-5433.

Any inquiry of general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0661.

A handwritten signature in black ink, appearing to read "Randy Gulakowski". The signature is fluid and cursive, with a large initial "R" and "G".

RANDY GULAKOWSKI  
SUPERVISORY PATENT EXAMINER  
TECHNOLOGY CENTER 1700

JSC

February 9, 2003